

VIKING PUMP

VIKING MAG DRIVE®

TECHNICAL SERVICE MANUAL

CAST IRON, STEEL & STAINLESS STEEL PUMPS

SERIES 895, 893, 897

SIZES GG, HJ, HL, AS, AK, AL

SECTION	TSM 680
PAGE	1 OF 17
ISSUE	G

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WARNING!

Persons with surgical implants of a metallic or electronic nature should avoid working on pump – especially the inner magnet assembly.

INTRODUCTION

The illustrations used in this manual are for identification purposes only and cannot be used for ordering parts. Obtain a parts list from the factory or a Viking® representative. Always give the complete name of the part, part number and material with model number and serial number of pump when ordering repair parts. The unmounted pump or pump unit model number and serial number can be found on the nameplate secured to the pump.

This manual deals only with Series 895, 893 and 897 magnetic drive pumps. Refer to Figures 1 through 44 for general configuration and nomenclature used in this manual. Pump specifications and recommendations are listed in Catalog Section 680.

In the Viking model number system, the basic size letters are combined with the series number (895, 893, 897) indicating basic pump construction material (cast iron, steel, and stainless steel respectively).

MODEL NUMBER CHART

UNMOUNTED PUMPS	UNITS
GG-895, 893, 897	Units are designated by the unmounted pump model numbers followed by the magnetic coupling size and a letter indicating drive style. D = Direct Drive M = Motor Mount B = Bearing Carrier R = Viking Reducer Drive P = Commercial Reducer Drive (Example: HJ895 MD-A9 R)
HJ-895, 893, 897	
HL-895, 893, 897	
AS-895, 893, 897	
AK-895, 893, 897	
AL-895, 893, 897	



FIGURE 1 - GG, HJ, HL SERIES 893(Steel) or SERIES 897 (Stainless Steel) MD-A B Bearing Carrier, Footed Bracket and Mounted Pump with Flanged Ports



FIGURE 2 - HJ, HL SERIES 895(Cast Iron) MD-B M Motor Directly mounted to the Bracket and Pump with Tapped Ports



FIGURE 3 - AS, AK, AL SERIES 895 MD-C B Bearing Carrier, Footed Bracket and Mounted Pump with Tapped Ports

SAFETY INFORMATION AND INSTRUCTIONS

IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF PUMP MAY CAUSE SERIOUS INJURY OR DEATH AND/OR RESULT IN DAMAGE TO PUMP AND/OR OTHER EQUIPMENT. VIKING'S WARRANTY DOES NOT COVER FAILURE DUE TO IMPROPER INSTALLATION, OPERATION OR MAINTENANCE.

THIS INFORMATION MUST BE FULLY READ BEFORE BEGINNING INSTALLATION, OPERATION OR MAINTENANCE OF PUMP AND MUST BE KEPT WITH PUMP. PUMP MUST BE INSTALLED, OPERATED AND MAINTAINED ONLY BY SUITABLY TRAINED AND QUALIFIED PERSONS.

THE FOLLOWING SAFETY INSTRUCTIONS MUST BE FOLLOWED AND ADHERED TO AT ALL TIMES.

Symbol
Legend :



Danger - Failure to follow the indicated instruction may result in serious injury or death.

WARNING

Warning - In addition to possible serious injury or death, failure to follow the indicated instruction may cause damage to pump and/or other equipment.



BEFORE opening any liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting, etc.) be sure that :

- Any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
- The pump drive system means (motor, turbine, engine, etc.) has been "locked out" or otherwise been made non-operational so that it cannot be started while work is being done on the pump.
- You know what material the pump has been handling, have obtained a material safety data sheet (MSDS) for the material, and understand and follow all precautions appropriate for the safe handling of the material.

WARNING

INSTALL pressure gauges/sensors next to the pump suction and discharge connections to monitor pressures.



WARNING

USE extreme caution when lifting the pump. Suitable lifting devices should be used when appropriate. Lifting eyes installed on the pump must be used **only** to lift the pump, **not** the pump with drive and/or base plate. If the pump is mounted on a base plate, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached. For weight of the pump alone (which does not include the drive and/or base plate) refer to the Viking Pump product catalog.



BEFORE operating the pump, be sure all drive guards are in place.



DO NOT attempt to dismantle a pressure relief valve that has not had the spring pressure relieved or is mounted on a pump that is operating.



DO NOT operate pump if the suction or discharge piping is not connected.



AVOID contact with hot areas of the pump and/or drive. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), improper installation, improper operation, and improper maintenance can all cause high temperatures on the pump and/or drive.



DO NOT place fingers into the pumping chamber or its connection ports or into any part of the drive train if there is **any possibility** of the pump shafts being rotated.



WARNING

DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those the pump was originally supplied, without confirming its suitability for the new service.



WARNING

THE PUMP must be provided with pressure protection. This may be provided through a relief valve mounted directly on the pump, an in-line pressure relief valve, a torque limiting device, or a rupture disk. If pump rotation may be reversed during operation, pressure protection must be provided on **both** sides of pump. Relief valve adjusting screw caps must always point towards suction side of the pump. If pump rotation is reversed, position of the relief valve must be changed. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure. For additional information, refer to Viking Pump's Technical Service Manual TSM 000 and Engineering Service Bulletin ESB-31.



WARNING

BEFORE operating the pump, be sure that:

- It is clean and free from debris
- all valves in the suction and discharge pipelines are fully opened.
- All piping connected to the pump is fully supported and correctly aligned with the pump.
- Pump rotation is correct for the desired direction of flow.



WARNING

THE PUMP must be installed in a manner that allows safe access for routine maintenance and for inspection during operation to check for leakage and monitor pump operation.

SPECIAL INFORMATION

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting etc.) Be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) Has been "locked out" or made non- operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

ROTATION: Viking Mag Drive pumps are designed to run in the direction indicated on the nameplate only. If rotation must be reversed, See **PUMP ROTATION**, page 11.

PRESSURE RELIEF VALVES:

1. Viking pumps are positive placement pumps and must be provided with some sort of pressure protection. This may be a relief valve mounted directly on the pump, an inline pressure relief valve, a torque limiting device or a rupture disk. Do not rely on decoupling of magnets for protection from over pressure; this may result in damage to the magnets, pump, or other equipment.
2. Relief valves are mounted as standard on the head of GG, HJ, and HL size pumps and on the casing of AS, AK, and AL size pumps. Relief valves are not available on jacketed heads (GG, HJ & HL).
3. If the pump rotation is to be reversed during operation, pressure protection must be provided on *both* sides of the pump.
4. The relief valve adjusting screw cap must always point towards the suction side of the pump. **See Figure 4.** If the pump rotation is reversed, remove the pressure relief valve and turn end for end (see **PUMP ROTATION**, page 11 first for additional steps required for proper operation).
5. Pressure relief valves cannot be used to control pump flow or regulate discharge pressure.

For additional information on pressure relief valves, refer to Technical Service Manual TSM000 and Engineering Service Bulletin ESB-31.

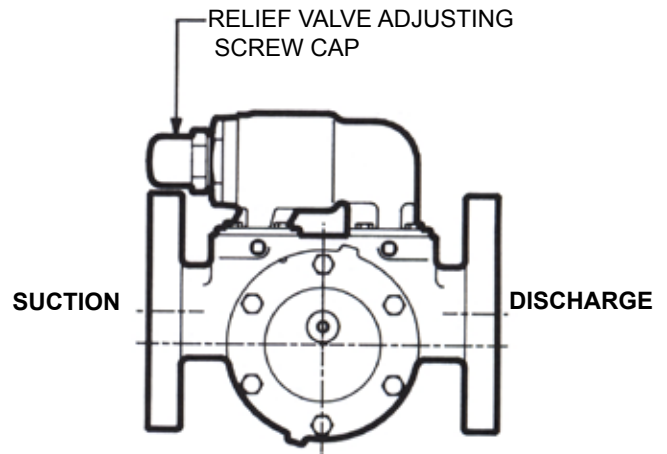


FIGURE 4

CAUTION !

Rare earth magnets used in couplings have extremely strong magnetic fields capable of changing performance or damaging items such as the following:

**Pacemakers
Metal Implants
Watches
Computers & disks
Credit Cards**

Completely assembled magnetic couplings will not affect items listed above – only disassembled components.

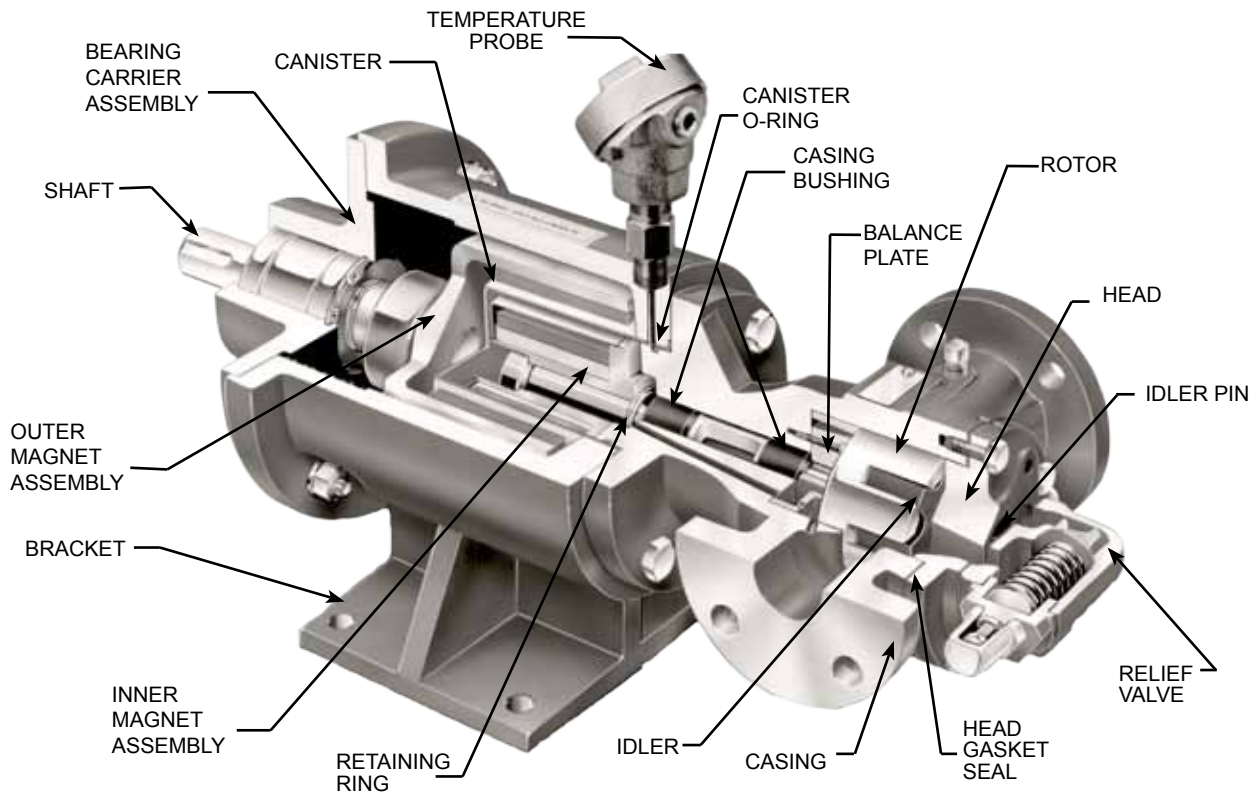
There are no known harmful effects of these magnetic fields on the human body.

MAINTENANCE

Series 895, 893 and 897 pumps are designed for long, trouble-free service life under a wide variety of application conditions with a minimum of maintenance. The points listed below will help provide long service life.

CLEANING PUMP:

Keep the pump as clean as possible. This will facilitate inspection, adjustment and repair work.



CUTAWAY VIEW MAG DRIVE PUMP, MODEL HL 893 MD-B B ILLUSTRATED. (TYPICAL OF GG-HL SIZES)
FIGURE 5

MAINTENANCE (Cont.)

STORAGE:

If the pump and coupling are to be stored, the drain pump and pour non-detergent SAE 30-weight oil into the pump port. Apply grease to the pump or the coupling shaft extension, if present or accessible.

Viking suggests rotating the pump shaft every 30 days to circulate the oil in the pump. The coupling should be stored in a dry area.

Note: If the liquid to be pumped reacts with oil, use an acceptable alternate.

SUGGESTED REPAIR TOOLS:

The following tools are required to properly repair Series 895, 893, and 897 pumps. These tools are in addition to standard mechanics' tools such as open-end wrenches, pliers, screwdrivers, etc. Most of the items can be obtained from an industrial supply house.

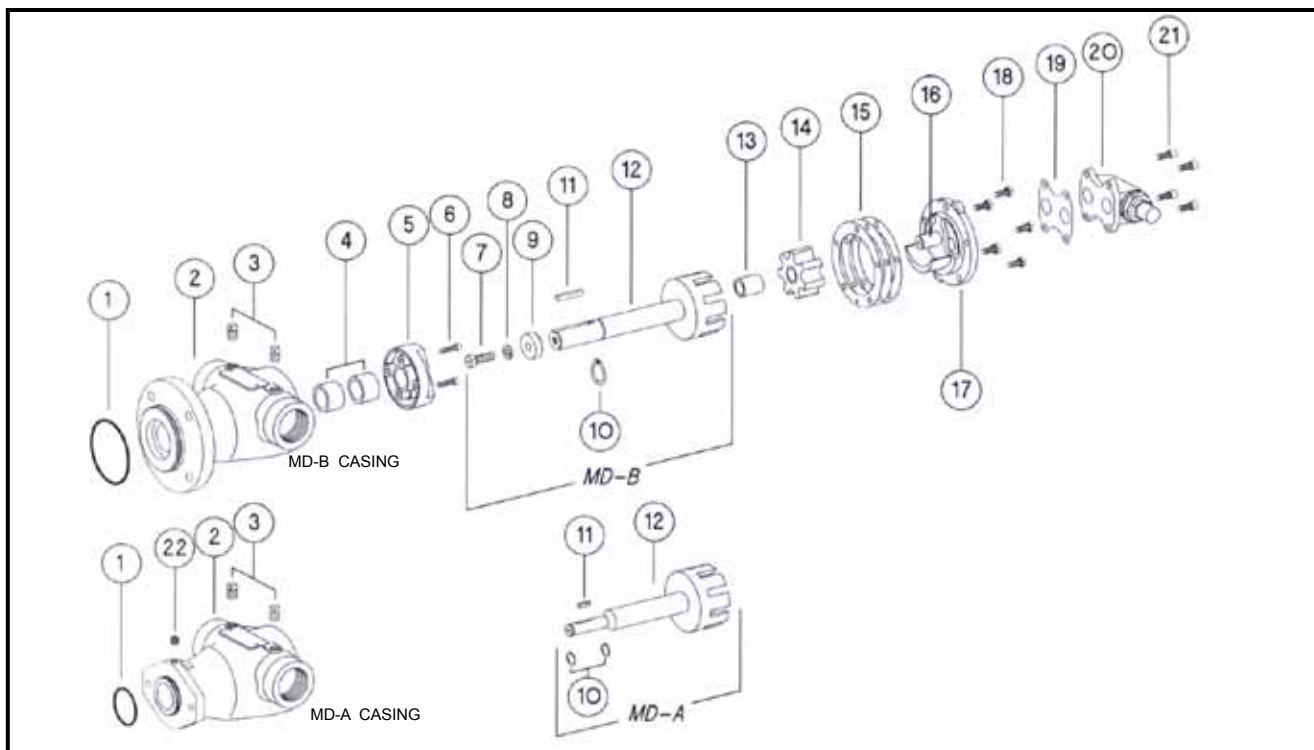
1. Soft face hammer
2. Allen wrenches (for set screws)
3. External snap ring pliers - 2-810-029-375
4. Internal snap ring pliers - 2 810-047-999
5. Feeler gauge set
6. Arbor press
7. Brass bar

PUMP DISASSEMBLY

WARNING!

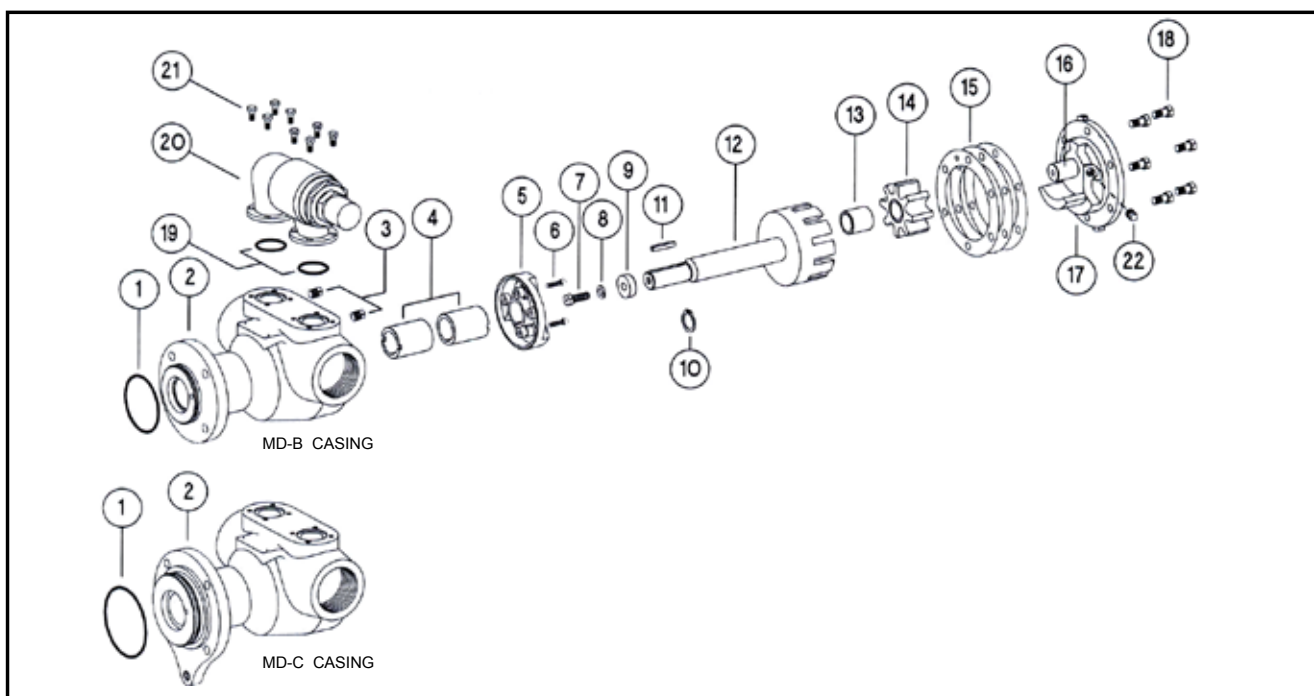
Refer to DANGER & CAUTION listed on page 2 before proceeding.

1. Refer to Figures 5, 6, 7, 8, 9 & 10 for names of parts.
2. Mark the head and casing before disassembly to insure proper reassembly.
3. Remove the head capscrews.
Note: The four valve capscrews, valve and gasket must be removed from the GG models before the six head capscrews are removed.
4. Remove the head from the pump. Do not allow the idler to fall from the idler pin. Tilt the top of the pump head back when removing to prevent this. Avoid damaging the head gasket set since all gaskets are required to maintain end clearance.
5. Remove the idler and bushing assembly. If the idler bushing needs to be replaced, see **"INSTALLATION OF BUSHINGS" on page 10**. If further disassembly is required, the pump must be separated from coupling. Refer to **"DISASSEMBLY OF COUPLING" on pages 7-9** before proceeding with Step 6.



EXPLODED VIEW – SIZES GG, HJ & HL MAG-DRIVE PUMPS

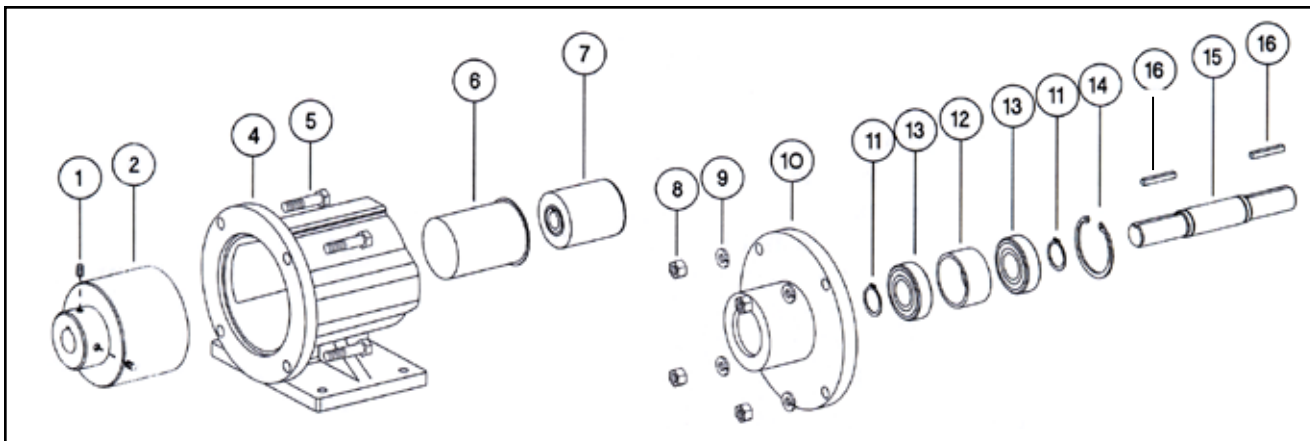
FIGURE 6



EXPLODED VIEW – SIZES AS, AK & AL MAG-DRIVE PUMPS

FIGURE 7

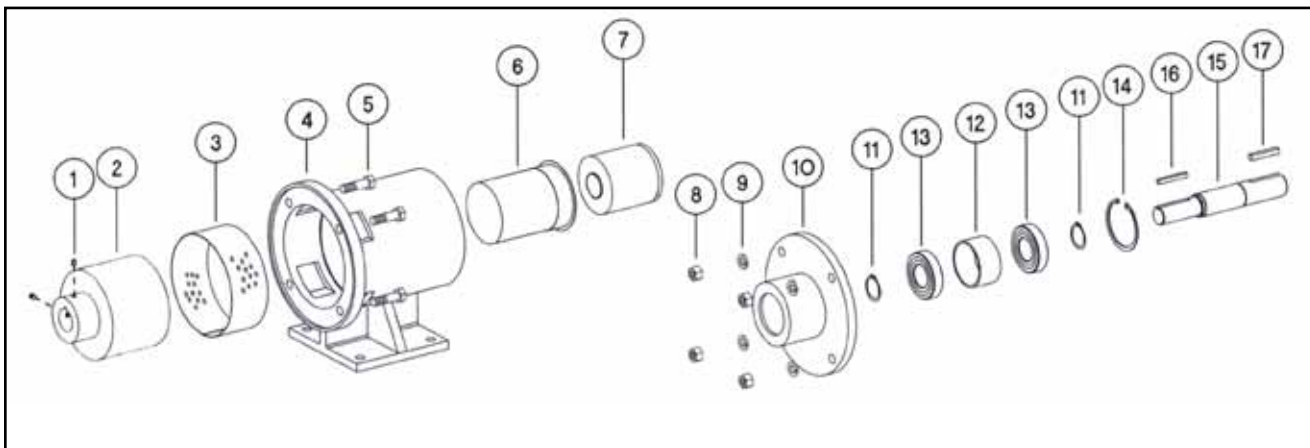
ITEM	NAME OF PART	ITEM	NAME OF PART	ITEM	NAME OF PART
1	Casing Pilot O-ring	9	Insert Washer	17	Head and Idler Pin
2	Casing	10	Retaining Ring	18	Capscrews for Head
3	Pipe Plug	11	Key	19	Gasket for Relief Valve
4	Casing Bushing	12	Rotor and Shaft	20	Relief Valve
5	Balance Plate	13	Idler Bushing	21	Capscrews for Relief Valve
6	Capscrew for Balance Plate	14	Idler and Bushing	22	Pipe Plug
7	Capscrew for Inner Magnet	15	Head Gasket Set		
8	Lock Washer	16	Idler Pin		



M DRIVE CONFIGURATION

**MD-A SERIES COUPLING
FIGURE 8**

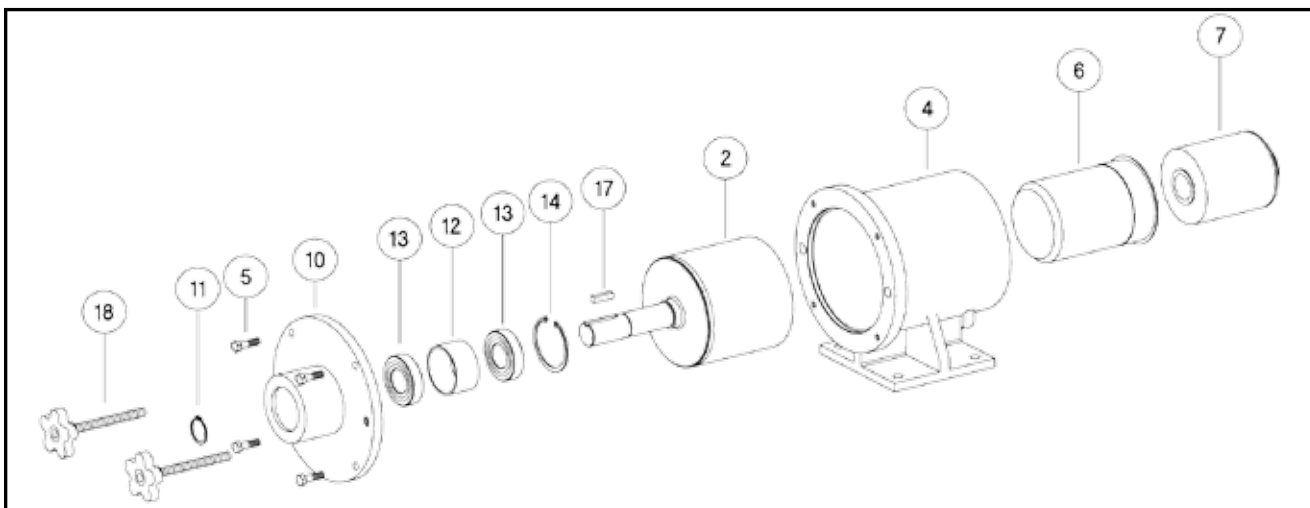
BEARING CARRIER COMPONENTS



M DRIVE CONFIGURATION

**MD-B SERIES COUPLING
FIGURE 9**

BEARING CARRIER COMPONENTS



BEARING CARRIER COMPONENTS

**MD-C COUPLING
FIGURE 10**

B DRIVE CONFIGURATION

ITEM	DESCRIPTION	ITEM	DESCRIPTION	ITEM	DESCRIPTION
1	Setscrew, Outer Magnet (2 Req'd)	7	Inner Magnet Assembly	13	Ball Bearings (2 Req'd)
2	Outer Magnet Assembly (3 Bore Sizes for A & B Series)	8	Hex Nuts (Bearing Carrier only, 4 Req'd – A & B Series)	14	Inner Retaining Ring
3	Shroud, Bracket (MD-B only)	9	Lock Washers (A & B Series)	15	Shaft
4	Bracket	10	Bearing Housing	16	Key (2 Req'd – A Series)
5	Capscrew for Motor or Bearing Carrier (4 Req'd)	11	External Retaining Ring (2 Req'd for A & B Series)	17	Key
6	Canister	12	Bearing Spacer	18	Hand Knobs (C Series)

PUMP DISASSEMBLY

6. With the inner magnet removed, now remove the key (not required on AS, AK or AL) and the external retaining ring from the shaft. The rotor and shaft may now be removed by tapping on the end of the shaft with a soft face hammer (If a soft face hammer is not available a regular hammer may be used with a piece of hardwood).
7. Remove the balance plate capscrews and pull the balance plate out.

The casing should be examined for wear, particularly in the area between ports. All parts should be checked for wear before the pump is reassembled.

When making major repairs, such as replacing a rotor and shaft, it is advisable to also install a new head and idler pin, idler and bushing, and casing bushings. See **"INSTALLATION OF BUSHINGS"** on page 10.

Clean all parts thoroughly and examine for wear or damage. Check bushings, idler pin and balance plate; replace if necessary.

DISASSEMBLY OF COUPLING

Series MD - A4 / A9 Coupling

1. Remove piping to ports and remove the capscrews securing pump to bracket. See Figure 11. Support the pump with an overhead hoist if possible.

CAUTION !

Do not place fingers onto front of pump mounting flange or face of bracket. Using extreme caution, pull inner magnet away from outer magnet. See Figure 12. If you do not completely pull the pump out it will snap back and could pinch a finger or hand. Once the inner magnet is removed from the bracket be careful setting it down as it will attract any steel object.

2. The canister will probably be full of liquid, therefore use care while removing from the pump and pull straight off.
3. Remove the external retaining ring (closest to the end of the shaft) and slide off the inner magnet assembly (See Figure 13). Do not forget this is a very strong magnet. If pump disassembly is required, remove second external retaining ring.
4. Do not remove the o-ring unless it is bad, especially PTFE (Derivative) Encapsulated. If a new o-ring is required, follow instructions in the **ASSEMBLY** section on page 11.
5. You should be able to visually inspect the outer magnets from the end of the bracket. If removal is necessary, start by removing the (4) capscrews (See Figure 14) and

separating the bracket from the motor or bearing carrier. Loosen the setscrew on the motor (or bearing carrier) shaft and pull the outer magnet assembly off. If the unit features a bearing carrier, the bearings should not require maintenance since they are sealed. If necessary, disassemble by removing the single internal retaining ring (See Figure 8) then press the shaft and bearings out of the housing. Remove the external retaining rings from the shaft to remove bearings.

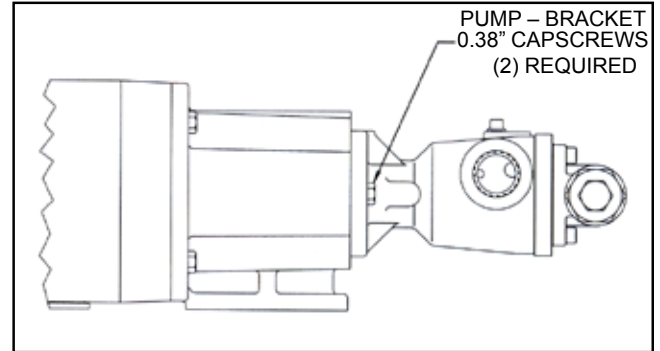


FIGURE 11

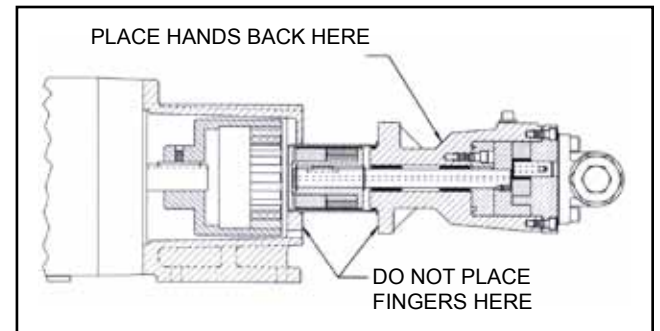


FIGURE 12

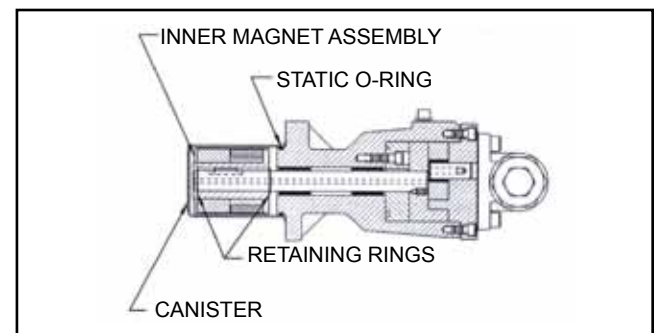


FIGURE 13

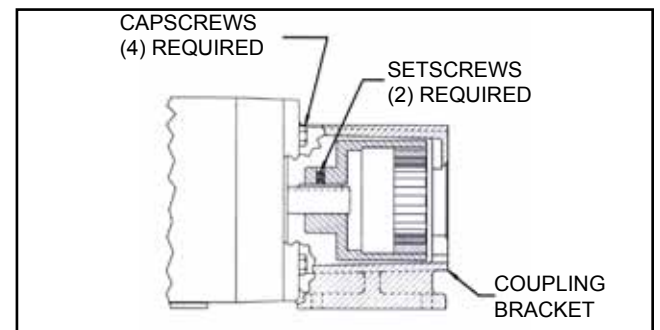


FIGURE 14

Series MD - B15 / MD - B40 Coupling

1. Remove the piping to the ports and remove the capscrews securing the pump to the bracket (**See Figure 15**). Support the pump with an overhead hoist if possible.

CAUTION !

Do not place your fingers between the pump mounting flange and the face of the bracket. Using extreme caution, pull the inner magnet away from the outer magnet (see figure 16). If you do not completely pull the pump out it will snap back and could pinch a finger or hand. Once the inner magnet is removed from the bracket be careful setting it down as it will attract any iron or steel object.

2. The canister will probably be full of liquid, therefore use care while removing from the pump and pull it straight off.
3. Insert a brass bar through a port between two rotor teeth and loosen the capscrew holding the inner magnet to the shaft (**See Figure 17**). Slide the washer, lock washer and inner magnet off the shaft. Do not forget this is a very strong magnet. If pump disassembly is required, remove second external retaining ring.
4. Do not remove the o-ring unless it is bad, especially if PTFE (Derivative) Encapsulated. If a new o-ring is required, follow instructions in the **ASSEMBLY** section on **page 11**.
5. You should be able to visually inspect the outer magnets from the end of the bracket. If removal is necessary, start by removing the (4) capscrews (**See Figure 18**) and separating the bracket from the motor or bearing carrier. Loosen the setscrews on the motor or bearing carrier shaft and pull the outer magnet assembly off. If the unit features a bearing carrier, the bearings should not require maintenance since they are sealed. If necessary, disassemble by removing the single internal retaining ring then press the shaft and bearings out of the housing. Remove the external retaining rings from the shaft to remove the bearings.

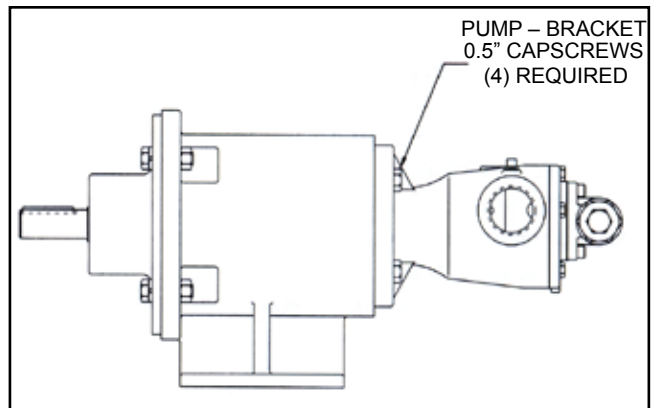


FIGURE 15

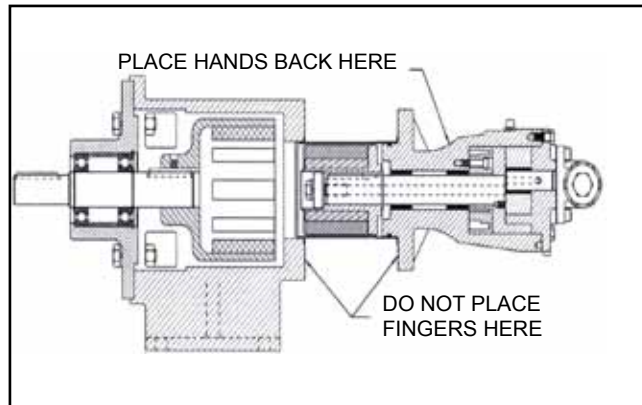


FIGURE 16

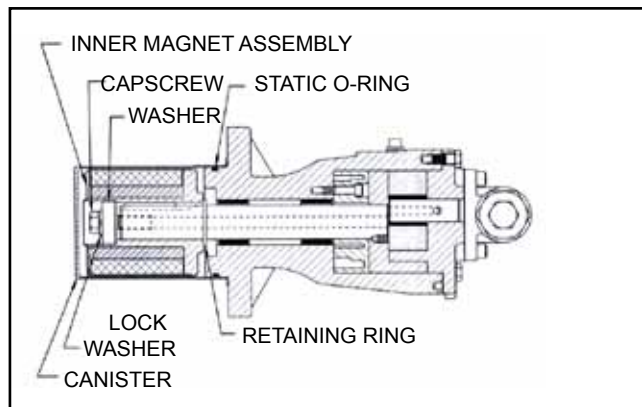


FIGURE 17

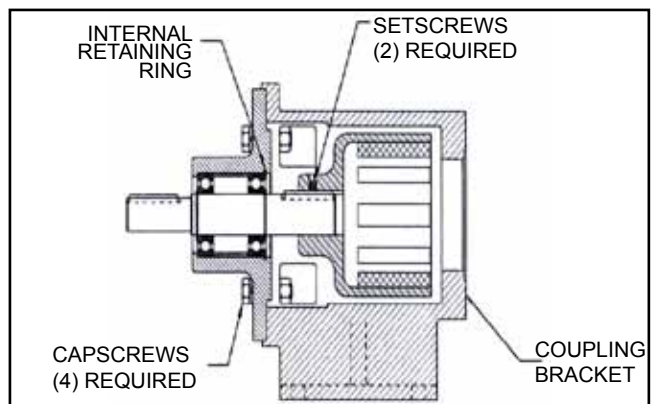


FIGURE 18

Series MD – C80 Coupling

1. If the unit has a spacer coupling then the bracket of the mag coupling can stay bolted to base. Without the spacer coupling, either the reducer will need to be removed or the bracket unbolted. Remove the piping to the pump, provide a minimum of 4" of clearance beyond end of coupling shaft. Insert (2) 1/2" hand knobs which have a minimum of 4.5" of full threads into the two tapped holes at the 9:00 and 3:00 o'clock positions on the back of the bearing housing. Remove the (4) 0.38" capscrews. See Figure 19.

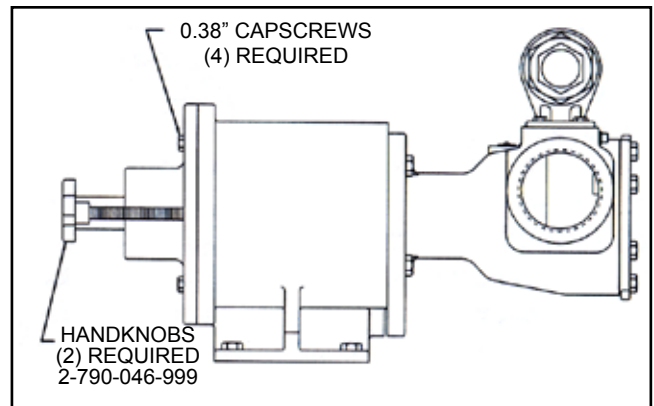


FIGURE 19

CAUTION !

Do not place your fingers between the pump mounting flange and the face of the bracket. Using extreme caution, pull the inner magnet away from the outer magnet (see figure 21). If you do not completely pull the pump out it will snap back and could pinch a finger or hand. Once the inner magnet is removed from the bracket be careful setting it down as it will attract any iron or steel object.

2. Turn the hand knobs evenly to back out the bearing housing and outer assembly. See Figure 20.

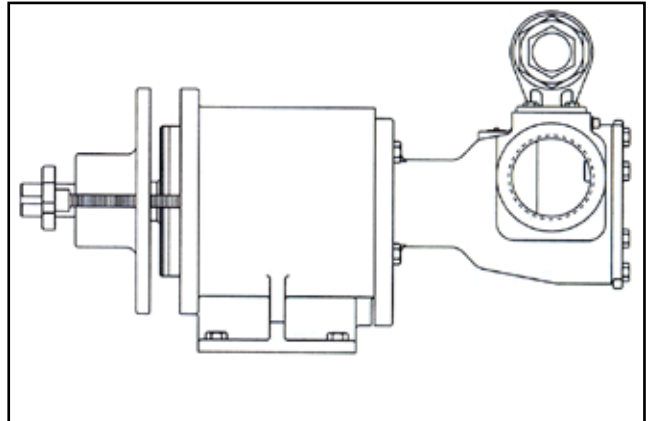


FIGURE 20

CAUTION !

Do not attempt to pull the magnet assemblies apart by hand until the outer magnet assembly has been backed off 4". Support the outer magnet assembly and pull completely away from the inner magnet. Be careful when setting down this unit to avoid tools and other metal objects being attracted to the end of the magnet.

3. Support the pump with a hoist and remove the (4) 0.5" capscrews. See Figure 21. Pull the pump out of the bracket; there will be some resistance since the inner magnet assembly will be attracted to the iron bracket. If further disassembly of the bearing carrier is required, refer to page 10. Since there will be some liquid left in the canister, be aware that the liquid may run out when the canister is removed from the pump.
4. Insert a brass bar through a port between two rotor teeth and loosen the capscrew holding the inner magnet to the shaft. See Figure 22. Slide the washer, lock washer and inner magnet off the shaft. Do not forget this is a very strong magnet. If pump disassembly is required, remove the external retaining ring.
5. Do not remove the o-ring unless it is bad, especially if PTFE (Derivative) Encapsulated. If a new o-ring is required, follow instructions in the ASSEMBLY section on page 11.

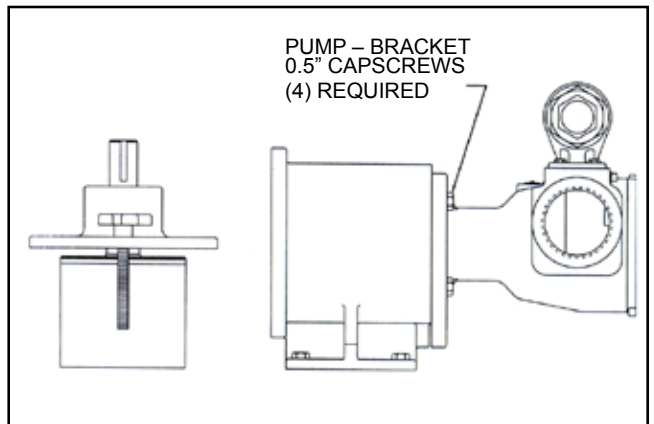


FIGURE 21

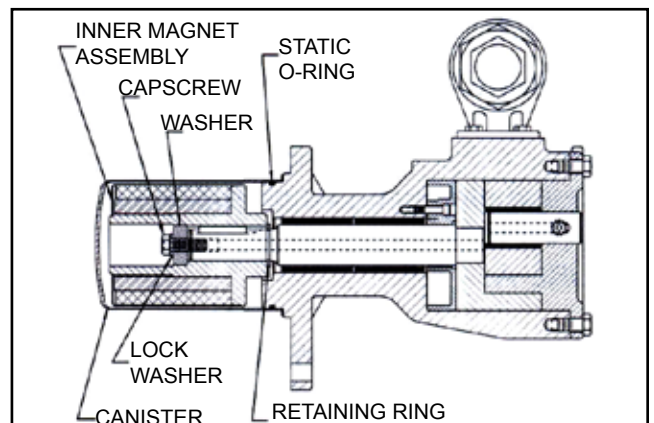


FIGURE 22

DISASSEMBLY / ASSEMBLY OF BEARING HOUSING

DISASSEMBLY

The bearing housing features two sealed ball bearings along with an outer magnet assembly. If further disassembly of this unit is required, proceed as follows:

1. Cover the open end of the outer magnet with a piece of sheet metal or cardboard. This will keep foreign material out of the magnet area. Set the assembly face down with the shaft pointing up and remove the hand knobs.
2. Remove the external retaining ring from shaft, place the unit into a press and push out shaft as shown in **Figure 24**. Support the outer magnet to prevent it from dropping and possibly being damaged.
3. Remove the internal retaining ring and press out the bearings.

ASSEMBLY

1. Press one (1) bearing into the housing bore. The pressing tool (2.40" OD x 1.55" ID x 3" long) must seat on both the inner and the outer bearing races. Position the bearing spacer in the bore and insert the second bearing. Press down, insuring the bearing spacer is centered between the inner bearing races, until the bearings bottom out. Install the internal retaining ring into the bearing housing.
2. Set the outer magnet assembly upright in press. Slide the bearing housing over the shaft of the outer magnet assembly until it meets resistance as shown in **Figure 25**. Place the pressing tool on the end of the bearing and press the housing down until the bearing bottoms out on the shaft shoulder. Install the external retaining ring on the shaft of outer magnet assembly.

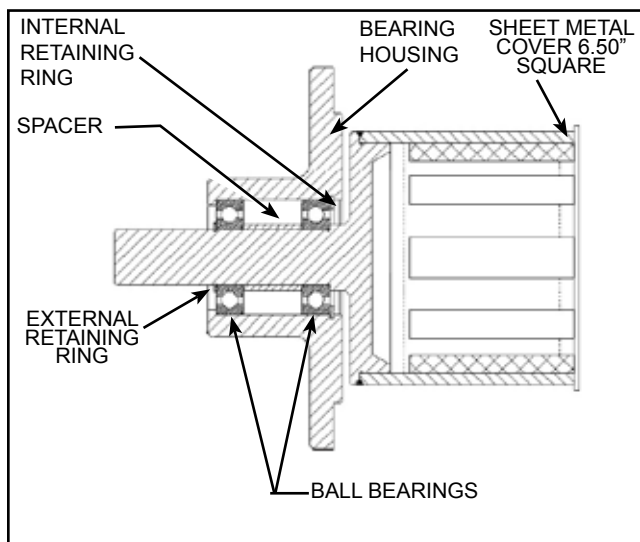


FIGURE 23

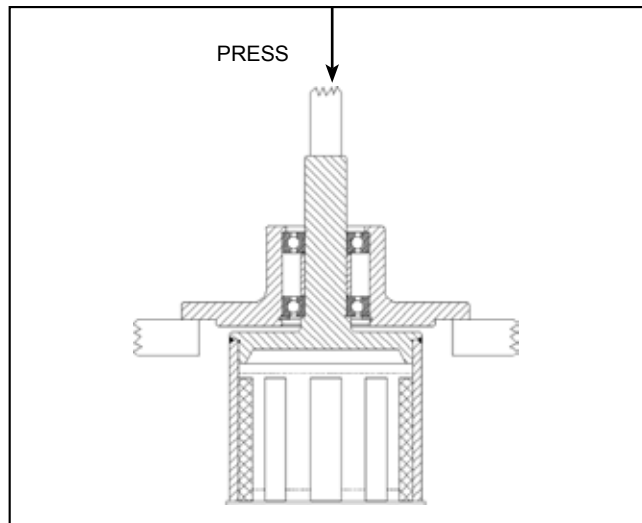


FIGURE 24

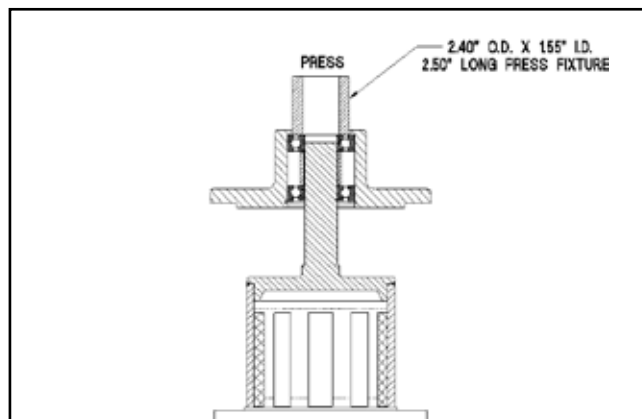


FIGURE 25

INSTALLATION OF BUSHINGS

CARBON GRAPHITE

When installing carbon graphite bushings, extreme care must be taken to prevent breaking. Carbon graphite is a brittle material and easily cracked. If cracked, the bushing will quickly disintegrate. Using a small amount of lubricant on the bushing and mating part will help facilitate installation. The additional precautions listed below must be followed for installation:

1. An arbor press must be used for installation.
2. Be certain the bushing is started straight.
3. Do not stop the pressing operation until the bushing is in the proper position; starting and stopping will result in a cracked bushing.
4. Check the bushing for cracks after installation.

SILICON CARBIDE

When installing silicon carbide bushings into a metal part, the mating part must be heated to 600 °F (preferably in an oven). The bushing must be put into the proper position quickly before the mating part cools down and the bushing heats up. Failure to follow this procedure will result in cracked bushings.

ASSEMBLY OF PUMP

Use a suitable lubricant compatible with the fluid being handled when reassembling the pump.

Inspect all parts, especially drilled holes in the casing for the suck back system, to make sure they are not plugged. Replace any worn parts, remove any burrs, and clean all parts before assembling the pump.,

1. If the canister o-ring needs to be replaced, apply a lubricant to the o-ring and place it into the o-ring groove. If the o-ring is PTFE (Derivative) Encapsulated, follow these special instructions.

Do not attempt to reuse a PTFE (Derivative) Encapsulated o-ring if it has been removed. Immerse a new o-ring in boiling water for a few minutes. Remove it from the water and stretch out the o-ring so it will fit onto the casing hub without forcing it over a sharp edge. Run hot water over the o-ring until it shrinks down tight onto the pilot of the pump. Dry with compressed air.

2. Place the balance plate into the casing bore with counterbores for the capscrews facing out and push it to the bottom of the bore. Align holes to install capscrews. Install the capscrews and tighten evenly to 10 in-lbs.
3. Clean the rotor and shaft so it is free of dirt, grit and other debris and apply lubricant. Push it into the casing as far as it will go.
4. If the old gaskets are not reusable, refer to “**ADJUSTING HEAD GASKET END CLEARANCE**” on **page 14**. Otherwise, place the head gaskets on the head. The proper amount of gaskets should be used to provide the correct end clearance. **Figure 26** gives the quantity of gaskets available in a gasket set along with standard end clearance. Refer to Technical Reference TR-807 for detailed instructions on setting end clearance.

PUMP MODEL	NORMAL (A) END CLEARANCE	SET OF GASKETS INCLUDES
GG 895, 893	0.003	(1) .015 (2) .007 (2) .005
GG 897	0.005	
HJ,HL 895, 893	0.005	
HJ, HL 893, 897	0.005	
AS, AK or AL 895, 893	0.005	
AS, AK or AL 897	0.008	

FIGURE 26

NOTE: End Clearances are adequate for viscosity's up to 2500 SSU (SAE 40-lube oil at room temperature). Higher viscosity's require additional clearances. As a general rule the end clearance is doubled for higher viscosity's. For specific recommendations for end clearance for viscosity or for operating temperatures above 225 °F, check with your Viking representative or consult the factory.

5. Coat the idler pin with a suitable lubricant and place the idler on the idler pin in head.

6. The head can now be assembled onto the pump. Tilt the top of the pump head away from the pump slightly until the crescent enters the inside diameter of the rotor and rotate the idler until its teeth mesh with the rotor teeth.

The Pump head and casing should have been marked before disassembly to insure proper reassembly. If not, be sure the idler pin, which is offset in the pump head, is positioned toward and an equal distance from the port connections to allow for proper flow of liquid through the pump.

7. Place the key into shaft keyway and then follow the instructions listed for assembling the appropriate size coupling on **pages 12 through 14**.

CHANGING PUMP ROTATION

Cooling circulation in the pump is designed to take fluid from the discharge side of the pump and channel it down the idler pin into the shaft and out the far end of the shaft into the bottom of the canister. The fluid is returned through a hole in the casing back to the suction side of the pump. There are generally three parts, which may need replacing or adjusting. Technical Reference TR-112 provides additional information about changing rotation. Contact your authorized distributor or the factory to request a copy.

HEAD & PIN- The hole should be from the discharge side of head to the pin. Some sizes are tapped on both sides and the pipe plug may be moved to the other side of the head but other models will require a new part.

BALANCE PLATE- Most designs currently are directional and require a new part.

CASING- Some are drilled and tapped for either direction but most feature a single hole and require a second hole for proper return of the cooling fluid. The initial casing hole is generally plugged or restricted with an orifice or by the new balance plate.

Contact your local Viking distributor or the factory to determine which parts are required.

ASSEMBLY OF COUPLING

Series MD – A4 / A9 Coupling

DANGER!

Follow these directions exactly to avoid injury to self or damage to pumping unit. Be careful to keep inner and outer magnets at least (1) foot apart until step 5. Do not engage magnets in any other fashion.

1. Inspect the magnets for any steel objects, which may be attached. Remove any foreign material. Apply Loctite and tighten the setscrews onto the motor or bearing carrier key and shaft. Locate outer magnet assembly on the motor shaft per dimension. **See Figure 27.**
2. Mount the coupling bracket to the motor (or bearing carrier) and secure with the 4 capscrews. **See Figure 28.** Reach in and rotate the magnets by hand to make sure there is no interference. If rubbing occurs check dimension in **Figure 27** or contact the factory.
3. Install the first external retaining ring (in the groove closest to the casing) and the key on the pump shaft. Slide the inner magnet assembly onto the shaft, (the counterbore of the magnet is pointed away from the pump) so that it butts against the snap ring. Install the second external retaining ring (closest to end of shaft) to secure magnet. **See Figure 29.**
4. Check to make sure the pump rotates freely by turning the inner magnet assembly. Inspect the magnet to make sure it has not picked up any foreign particles, which could damage the pump. Make sure the static o-ring is in good condition and in place. Place the canister onto pump and press on until the canister is in contact with the pump mounting flange.

CAUTION !

Do not place fingers onto front of pump mounting flange. Align canister into bore of bracket and gently slide in. When magnets start to engage, the unit will finish engagement on its own very rapidly. Make sure fingers are not on the front of the pump (see figure 30).

5. Be certain that the power supply to the pump is "Locked-out". Check that pump rotates freely by spinning motor fan blades or bearing carrier shaft. Finish the assembly by securing the pump to bracket (**See Figure 31**). Be certain that the power supply to the pump is "Locked-out". Check that pump rotates freely by spinning motor fan blades or bearing carrier shaft.

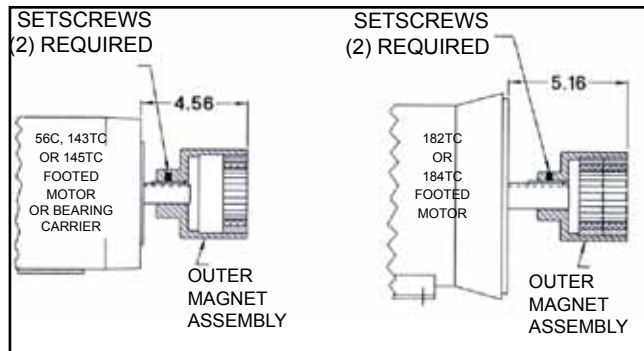


FIGURE 27

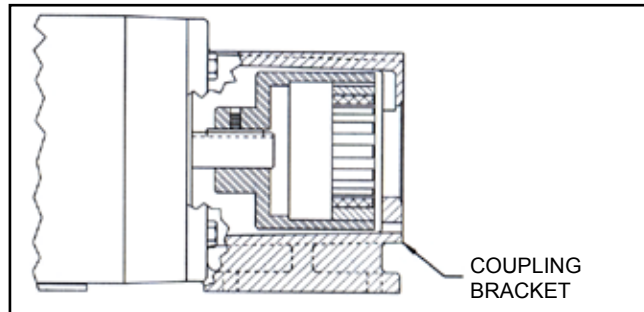


FIGURE 28

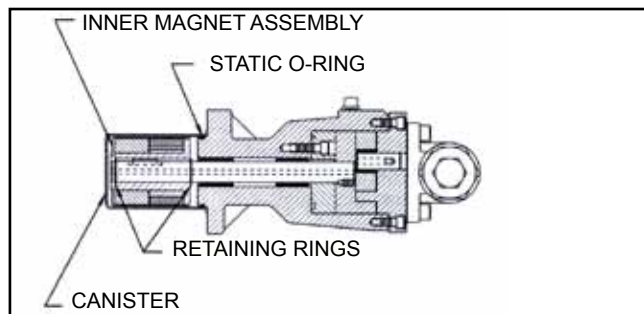


FIGURE 29

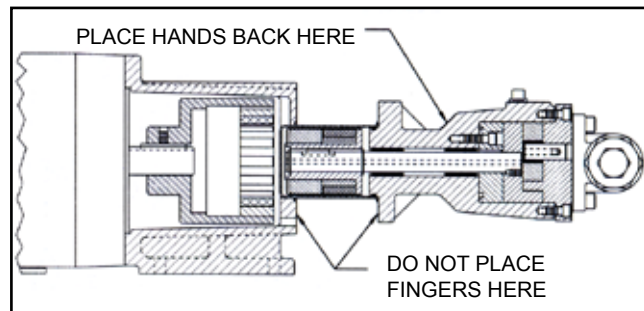


FIGURE 30

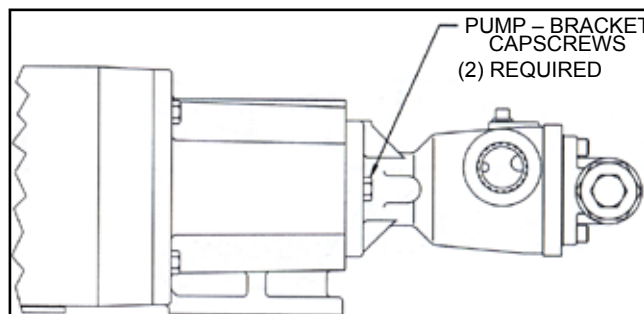


FIGURE 31

Series MD – B15 / B40 Coupling

DANGER !

Follow these directions exactly to avoid injury to self or damage to pumping unit. Be careful to keep inner and outer magnets at least (1) foot apart until step 4. Do not engage magnets in any other fashion.

1. Inspect the magnets for any steel objects, which may be attached. Remove any foreign material. Locate the outer magnet assembly per dimension **See Figure 32**. Apply Loctite and tighten the setscrews onto motor or bearing carrier key and shaft.
2. If the bracket is not fastened to a base, clamp it down **See Figure 33**. Mount the motor or bearing carrier to the bracket and secure with (4) 0.5" capscrews. Reach in and rotate the magnets by hand to make sure there is no interference. If rubbing occurs check the dimension in **Figure 32** or contact the factory.
3. Install the external retaining ring and key on the pump shaft. Slide the inner magnet assembly onto the shaft so that it butts against the retaining ring. Install the washer, lock washer and capscrew to secure the magnet **See Figure 34**. Insert a brass bar through a port between two rotor teeth and tighten capscrew.
4. Check to make sure the pump rotates freely by turning the inner magnet assembly. Inspect the magnet to make sure it has not picked up any foreign particles, which could damage the pump. Make sure the static o-ring is in good condition and in place. Place the canister onto the pump and press on until it is in contact with the pump mounting flange.

CAUTION !

Do not place fingers onto front of pump mounting flange. Align canister into bore of bracket and gently slide in. When magnets start to engage, the unit will finish engagement on its own very rapidly. Make sure fingers are not on the front of the pump. **See Figure 35**.

5. Be certain that the power supply to the pump is "Locked-out". Finish assembly by securing the pump to the bracket. **See Figure 36**. Check that pump rotates freely by spinning the motor fan blades or the bearing carrier shaft.

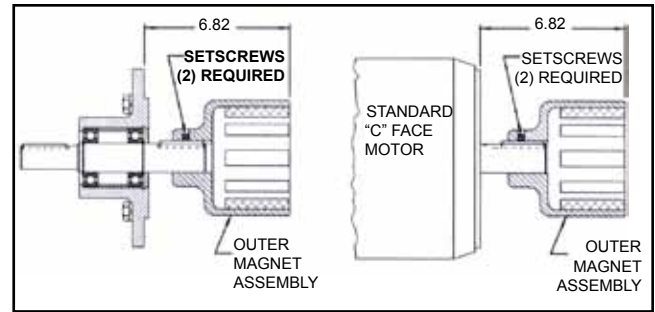


FIGURE 32

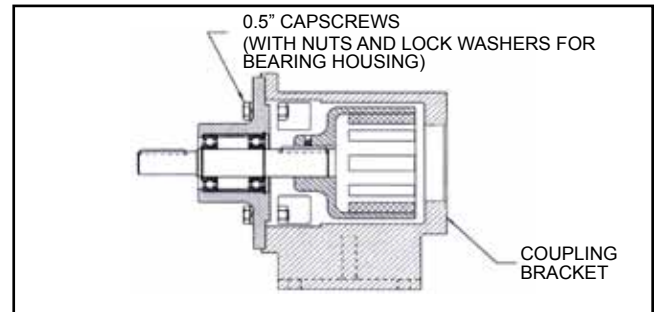


FIGURE 33

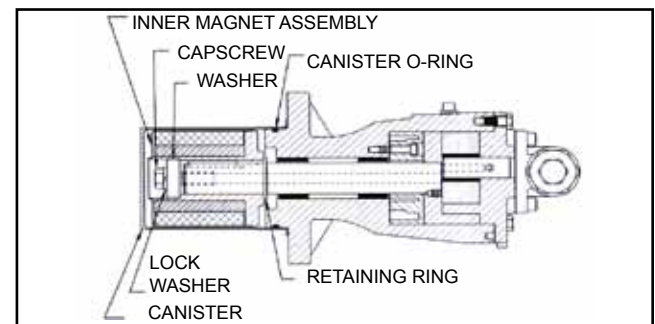


FIGURE 34

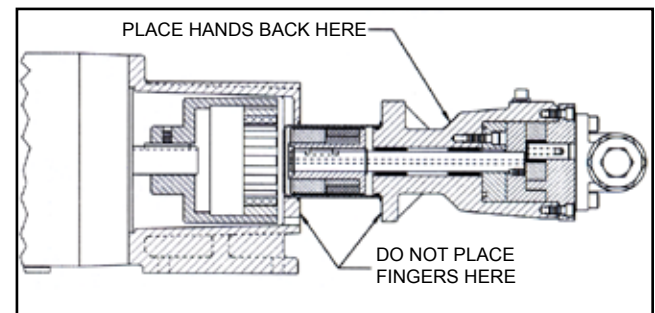


FIGURE 35

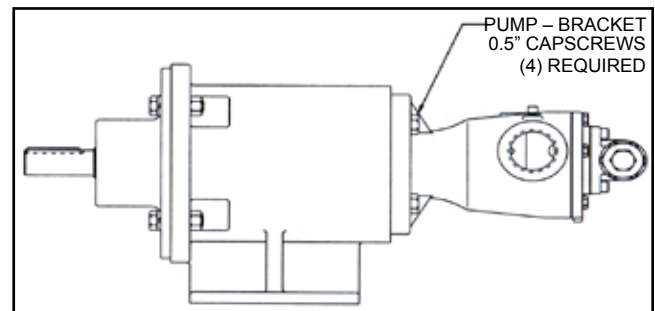


FIGURE 36

Series MD – C80 Coupling

DANGER !

Follow these directions exactly to avoid injury to yourself or damage to the pumping unit. Be careful to keep the inner and outer magnets at least (1) foot apart until step 3. Do not engage magnets in any other fashion.

1. Inspect the magnets for any steel objects attached to the magnets. Remove any foreign material. Place the external retaining ring and key on the pump shaft. Slide the inner magnet assembly onto shaft so it butts against retaining ring. Install the washer, lock washer and capscrew to secure the magnet. **See Figure 37.** Insert a brass bar through a port between two rotor teeth and tighten the capscrew.

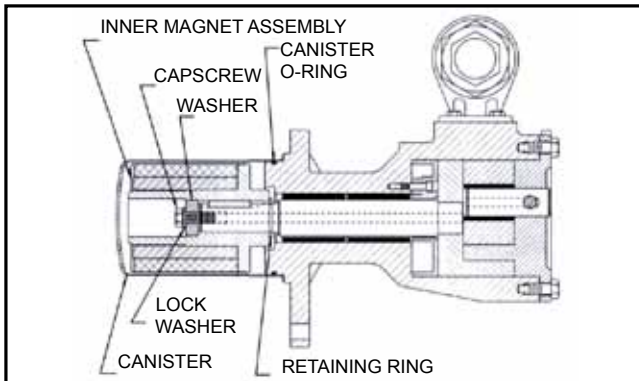


FIGURE 37

2. Inspect the canister o-ring for signs of wear and replace if necessary. Slide the canister over the inner magnet and press it over the o-ring until the canister meets the pump-mounting flange.
3. Support the pump from overhead and secure the coupling bracket to avoid tipping when the pump is attached. Using the canister as a guide, slide the pump and magnet assembly up to the coupling bracket through the smaller opening. Secure with the four 0.5" capscrews. **See Figure 38.**

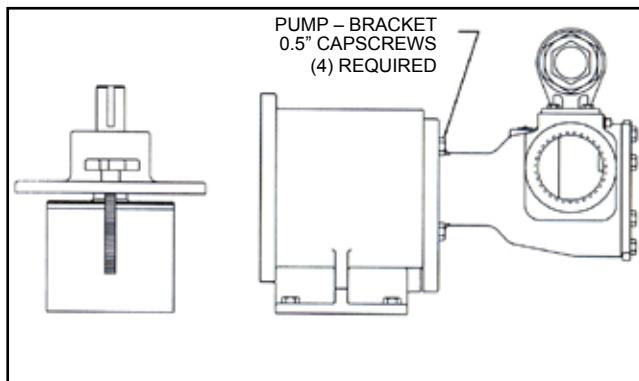


FIGURE 38

4. The outer magnet should be installed into the bearing housing, if not refer to **DISASSEMBLY/ASSEMBLY OF BEARING HOUSING, page 10.** Install the hand knobs so that 4" of threads are projecting below housing. Support the bearing housing from overhead and gently position the magnet over the canister so the magnet assemblies start to engage. Evenly back out the hand knobs. **See Figure 39.** The bearing housing should move toward the bracket as the hand knobs are removed.

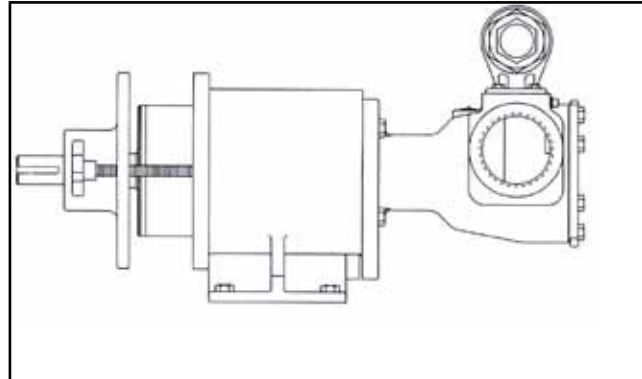


FIGURE 39

5. Install the (4) 0.38" capscrew. Turn the output shaft over by hand to make sure the pump rotates freely. **See Figure 40.**

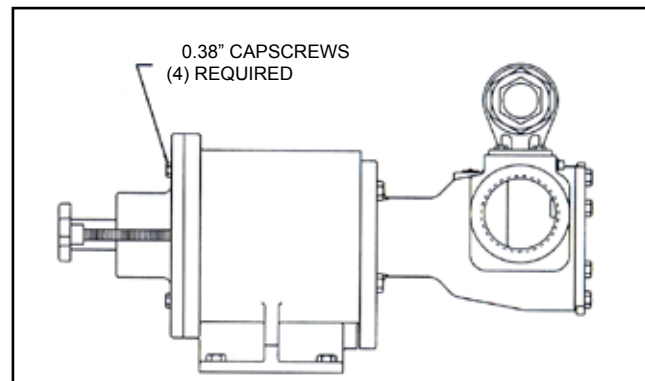


FIGURE 40

ADJUSTING HEAD GASKET END CLEARANCE

Use the following procedure to properly adjust the end clearance when replacing gaskets.

With the balance plate in position, slide the rotor and shaft into the casing. Insert a feeler gage of the proper thickness into the port and between the face of the rotor and the face of the idler (**See Figure 41**). Install one 0.015" and one 0.007" gasket onto the head. With the idler on the idler pin, place the head into the pump casing. With the capscrews tight, the feeler gage should fit snugly; otherwise gaskets should be added or removed until the proper clearance is attained.

Technical Reference TR-807 will provide additional information about setting clearances on an internal gear pump. This reference sheet is available through your authorized Viking distributor or contact the factory.



FIGURE 41

PRESSURE RELIEF VALVE INSTRUCTIONS

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting etc.) Be sure:

1. That any pressure in the chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.
2. That the driving means (motor, turbine, engine, etc.) Has been "locked out" or made non- operational so that it cannot be started while work is being done on pump.
3. That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.

Failure to follow above listed precautionary measures may result in serious injury or death.

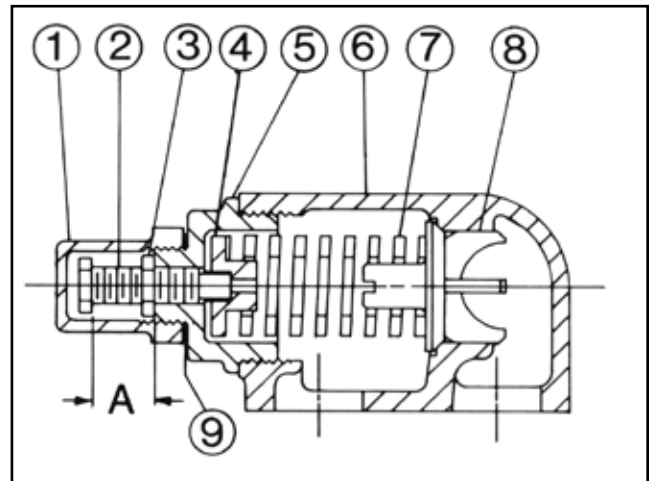
DISASSEMBLY – RELIEF VALVE

Mark the valve and head before disassembly to insure proper reassembly.

1. Remove the valve cap.
2. Measure and record the length of extension of the adjusting screw. Refer to "A" on **Figures 43 and 44**.
3. Loosen the locknut and back out the adjusting screw until spring pressure is released.
4. Remove the bonnet, spring guide, spring and poppet from the valve body. Clean and inspect all parts for wear or damage and replace as necessary.

ASSEMBLY – RELIEF VALVE

Reverse the procedures outlined under **DISASSEMBLY – RELIEF VALVE**. If the valve is removed for repairs, be sure to replace in the original position. The relief valve adjusting screw cap must **always** point towards the suction side of the pump. If the pump rotation is reversed, remove the relief valve and turn end for end. **Refer to Figure 4, page 3.**



VALVE – GG, HJ AND HL SIZES
FIGURE 43

VALVE - LIST OF PARTS	
1. Valve Cap	6. Valve Body
2. Adjusting Screw	7. Valve Spring
3. Lock Nut	8. Poppet
4. Spring Guide	9. Cap Gasket
5. Bonnet	

DANGER!

Before starting pump, be sure all drive equipment guards are in place.

Failure to properly mount guards may result in serious injury or death.

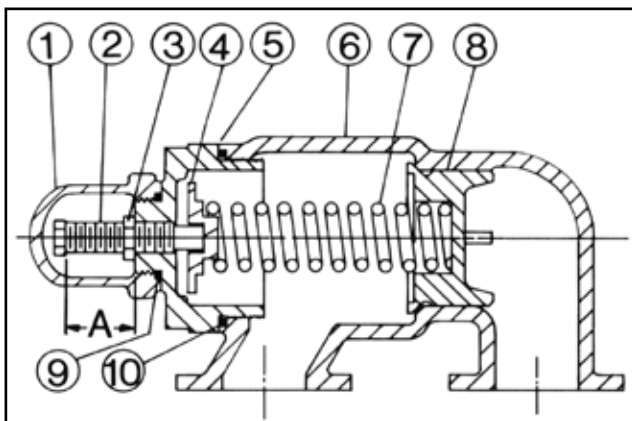
PRESSURE ADJUSTMENT

If a new spring is installed or if the pressure setting of pressure relief valve is to be changed from that which the factory has set, the following instructions must be carefully followed.

1. Carefully remove the valve cap, which covers adjusting screw.
2. Loosen the locknut, which locks the adjusting screw so pressure setting will not change during operation of pump.
3. Install a pressure gauge in the discharge line for actual adjustment operation.
4. Turn the adjusting screw in to increase pressure and out to decrease pressure.
5. With discharge line closed at a point beyond pressure gauge, gauge will show the maximum pressure valve will allow while the pump is in operation.

IMPORTANT

In ordering parts for pressure relief valve, always give model number and serial number of pump as it appears on nameplate and name of part wanted. When ordering springs, be sure to give pressure setting desired.



**VALVE – AS, AK AND AL SIZES
FIGURE 44**

VALVE - LIST OF PARTS

1. Valve Cap	6. Valve Body
2. Adjusting Screw	7. Valve Spring
3. Lock Nut	8. Poppet
4. Spring Guide	9. Cap Gasket
5. Bonnet	10. Bonnet Gasket

TROUBLESHOOTING

Some of the following may help pinpoint the problem:

Pump does not pump:

- Pump has lost its prime from air leak or low level in tank.
- Suction lift is too high.
- Pump is rotating in the wrong direction.
- The strainer may be clogged.
- The bypass valve is open, the pressure relief valve is set too low or the pressure relief valve poppet is stuck open.
- Improper end clearance.
- The pump is worn out.
- Are there any changes in liquid, system or operation that would influence pump or coupling performance, e.g. new liquid, additional lines or process changes?
- Temperature changes either in the liquid or the environment.
- The magnetic coupling is decoupling. Changes in application (temperature, pressure, viscosity, etc.) may require torque beyond coupling capabilities.

Pump starts, then loses its prime:

- The supply tank is empty.
- Liquid is vaporizing in the suction line.
- An air leak or air pocket in the suction line.

Pump is noisy:

- The pump is being starved (heavy liquid cannot get to pump fast enough). Increase the suction pipe size, reduce its length or slow down the pump.
- The pump is cavitating (liquid vaporizing in suction line). Increase suction pipe size or reduce its length.
- Check alignment.
- The magnetic coupling has decoupled. Shut off and restart.

Pump is not delivering up to capacity:

- The pump is starving or cavitating - increase suction pipe size or reduce length or reduce pump speed.
- The strainer is partially clogged.
- An air leak somewhere in suction line.
- The pump may be running too slow. Is motor the correct speed and wired up correctly?
- The pressure relief valve is set too low, stuck open or has a damaged poppet or seat.
- The bypass line around the pump is partially open.
- The pump is worn out or there is too much end clearance.

Pump takes too much power (stalls motor):

- The liquid is more viscous than the unit is sized to handle.
- The system pressure relief valve is set too high.
- The bushings have frozen up or the liquid has set up in the pump.



VIKING MAG DRIVE[®] TECHNICAL SERVICE MANUAL

CAST IRON, STEEL & STAINLESS STEEL PUMPS

SERIES 895, 893, 897

SIZES GG, HJ, HL, AS, AK, AL

SECTION	TSM 680
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CAUTION !

TO REDUCE THE RISK OF LEAKAGE WITH VIKING MAG DRIVE PUMPS, USERS SHOULD COMPLY WITH THE FOLLOWING GUIDELINES AND ADHERE TO THE FOLLOWING PROCEDURES:

- The pump configuration and materials used in a pump are tailored to the application for which it is ordered. Users should never use a pump for an application that is different from the application specified when the pump was ordered. This includes differences in liquid, speed, pressure, temperature or viscosity.
- Users must understand the characteristics of liquids they are pumping and be especially aware of any particulates in the liquid. Particulates can cause rapid wear of the bushings, especially if carbon graphite bushings are used. Hard bushings and hard shafts can reduce the risk of rapid wear, but the use of hard materials is not always the optimal solution. In applications involving non-abrasive, non-self lubricating liquids, carbon graphite bushings are typically the preferred material.
- Users should periodically inspect their pump for wear. This is especially critical and should be carried out with greater frequency when carbon graphite bushings are used or the same pump has not previously been used for the same application, including the same liquid, speed, pressure, temperature and viscosity. Users should promptly replace worn parts when they are discovered.
- Users should continuously monitor pumps that are handling hazardous liquids. This is especially critical for unmanned, remote locations. If a user does not have in-house expertise in the area of monitoring, it should contact a local engineering firm with monitoring experience.



WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. The warranty period for Universal Seal series pumps ONLY (Universal Seal models listed below) is three (3) years from date of startup, provided that in no event shall this warranty extend more than forty-two (42) months from the date of shipment from Viking.

UNDER NO CIRCUMSTANCES SHALL VIKING BE LIABLE UNDER THIS WARRANTY OR OTHERWISE FOR SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOST OR UNREALIZED SALES, REVENUES, PROFITS, INCOME, COST SAVINGS OR BUSINESS, LOST OR UNREALIZED CONTRACTS, LOSS OF GOODWILL, DAMAGE TO REPUTATION, LOSS OF PROPERTY, LOSS OF INFORMATION OR DATA, LOSS OF PRODUCTION, DOWNTIME, OR INCREASED COSTS, IN CONNECTION WITH ANY PRODUCT, EVEN IF VIKING HAS BEEN ADVISED OR PLACED ON NOTICE OF THE POSSIBILITY OF SUCH DAMAGES AND NOTWITHSTANDING THE FAILURE OF ANY ESSENTIAL PURPOSE OF ANY PRODUCT.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND SHALL BE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT ALL OF WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED.

See complete warranty at www.vikingpump.com.